FAIRCHILD
SEMICONDUCTOR™

PHOTODARLINGTON OPTOCOUPLERS

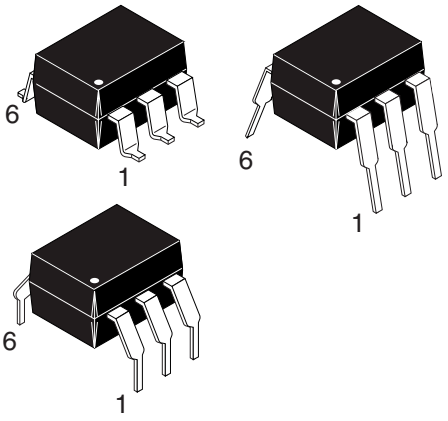
CNX48U H11B1 H11B2 H11B255 H11B3
MOC8080 TIL113

DESCRIPTION

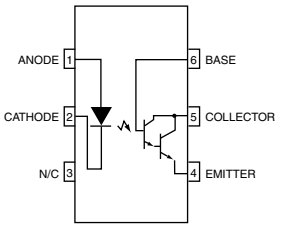
The CNX48U, H11BX, MOC8080 and TIL113 have a gallium arsenide infrared emitter optically coupled to a silicon planar photodarlington.

FEATURES

- High sensitivity to low input drive current
- Meets or exceeds all JEDEC Registered Specifications
- VDE 0884 approval available as a test option
  -add option .300. (e.g., H11B1.300)



SCHEMATIC



APPLICATIONS

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Solid state relays
- Interfacing coupling systems of different potentials and impedances.

Parameter	Symbol	Device	Value	Units
TOTAL DEVICE Storage Temperature	T_{STG}	All	-55 to +150	°C
Operating Temperature	T_{OPR}	All	-55 to +100	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°C
Total Device Power Dissipation @ T_A = 25°C	P_D	All	250	mW
Derate above 25°C			3.3	mW/°C
EMITTER Continuous Forward Current	I_F	All	100	mA
Reverse Voltage	V_R	All	6	V
Forward Current - Peak (300 µs, 2% Duty Cycle)	I_F(pk)	All	3.0	A
LED Power Dissipation @ T_A = 25°C	P_D	All	100	mW
Derate above 25°C			1.8	mW/°C
DETECTOR	BV_{CEO}	CNX48U, TIL113	30	V
Collector-Emitter Breakdown Voltage		H11B1, H11B2 H11B3	25	
		H11B255 MOC8080	55	
Collector-Base Breakdown Voltage	BV_{CBO}	CNX48U, H11B1 H11B2, H11B3 TIL113	30	V
		H11B255 MOC8080	55	V
Emitter-Collector Breakdown Voltage	BV_{ECO}	All	7	V
Detector Power Dissipation @ T_A = 25°C	P_D	All	150	mW
Derate above 25°C			2.0	mW/°C

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ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER							
Input Forward Voltage	(I_F = 10 mA)	V_F	H11B1, H11B2 H11B255 MOC8080 TIL113	0.8	1.2	1.5	V
	(I_F = 10 mA)		CNX48U		1.2	1.3	
	(I_F = 10 mA, T_A = -55°C)		MOC8080	0.9	1.3	1.7	
	(I_F = 10 mA, T_A = 100°C)			0.7	1.05	1.4	
	(I_F = 50 mA)		H11B3		1.35	1.5	
Reverse Leakage Current	(V_R = 6 V)	I_R	All		0.001	10	µA
Capacitance	(V_F = 0 V, f = 1.0 MHz)	C	All		50		pF
DETECTOR							
Collector-Emitter Breakdown Voltage	(I_C = 1 mA, I_F = 0)	BV_{CEO}	CNX48U	30	60		V
	(I_C = 100 µA, I_F = 0)		TIL113				
	(I_C = 10 mA, I_F = 0)		H11B1, H11B2 H11B3	25	60		
	(I_C = 100 µA, I_F = 0)		H11B255	55	70		
	(I_C = 1 mA, I_F = 0)		MOC8080				
Collector-Base Breakdown Voltage	(I_C = 100 µA, I_E = 0)	BV_{CBO}	CNX48U, H11B1 H11B2, H11B3 TIL113	30	100		V
	(I_C = 100 µA, I_F = 0)		H11B255 MOC8080	55	100		
Emitter-Collector Breakdown Voltage	(I_E = 100 µA, I_B = 0)	BV_{ECO}	All	7	10		V
Collector-Emitter Dark Current	(V_{CE} = 10 V, Base Open)	I_{CEO}	All		1	100	nA

Note
** Typical values at T_A = 25°C

CNX48U H11B1 H11B2 H11B255 H11B3 MOC8080 TIL113

TRANSFER CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ**	Max	Units
Collector Output Current[1]	(I_F = 10 mA, V_{CE} = 5 V)	I_C (CTR)	MOC8080	50 (500)			mA (%)
			H11B255	10 (100)			
	(I_F = 10 mA, V_{CE} = 1 V)		CNX48U	60 (600)			
			TIL113	30 (300)			
	(I_F = 1 mA, V_{CE} = 5 V)		H11B1	5 (500)			
			H11B2	2 (200)			
			H11B3	1 (100)			
	(I_F = 1 mA, V_{CE} = 1 V)		CNX48U	5 (500)			
	(I_F = 0.5 mA, V_{CE} = 1 V)			1.75 (350)			
Saturation Voltage	(I_F =1 mA, I_C = 1 mA)	$V_{CE(sat)}$	H11B1, H11B2 H11B3, MOC8080			1.0	V
	(I_F = 5 mA, I_C = 10 mA)		CNX48U			1.0	
	(I_F = 50 mA, I_C = 50 mA)		H11B255			1.0	
	(I_F = 8 mA, I_C = 2 mA)		TIL113			1.25	
AC Characteristics	(I_C = 10 mA, V_{CE} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	H11B1 H11B2 H11B255 H11B3		25		μs
		t_{off}			18		
Switching Times	(I_F = 10 mA, V_{CC} = 5 V) (R_E = 100 Ω), (R_{BE} = 1MΩ) (Fig. 8)	t_{on}	CNX48U		3.5		
		t_{off}			36		
	(I_F = 1 mA, V_{CC} = 5 V) (R_E = 1kΩ), (R_{BE} = 10MΩ) (Fig. 8)	t_{on}			70		
		t_{off}			190		
	(I_F = 5 mA, V_{CC} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	MOC8080		3.5		
		t_{off}			25		
	(I_F = 200 mA, I_C = 50 mA) (V_{CC} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	TIL113		0.35	5	
		t_{off}			55	100	

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Input-Output Isolation Voltage[2]	($I_{I-O} \leq$ 1 μA, Vrms, t = 1 min.)		5300			Vac(rms)
Isolation Resistance[2]	(V_{I-O} = 500 VDC)	R_{ISO}		10^{11}		Ω
Isolation Capacitance[2]	(V_{I-O} = ∅, f = 1 MHz)	C_{ISO}		0.8		pf

Note
** Typical values at T_A = 25°C

Fig. 1 Output Current vs. Input Current

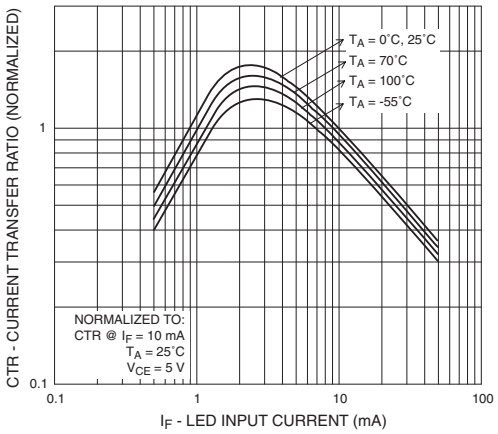


Fig. 2 Current Transfer Ratio vs. Ambient Temperature

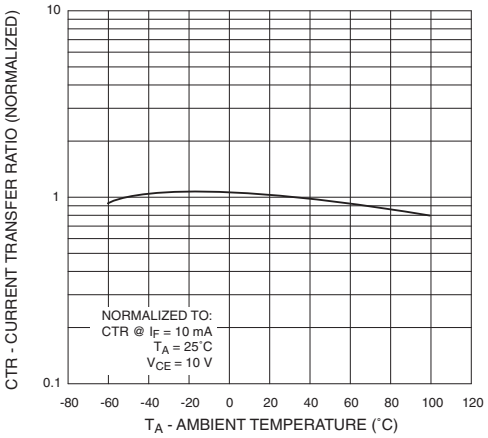


Fig. 3 Collector Current vs. Collector-Emitter Voltage

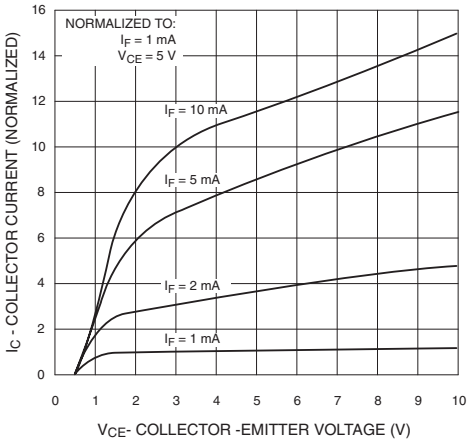


Fig. 4 Dark Current vs. Ambient Temperature

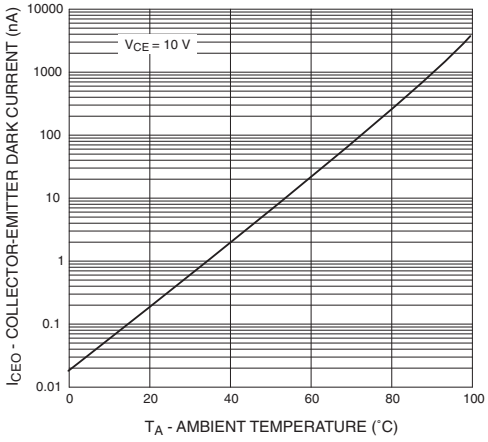


Fig. 5 Turn-On Time vs. Input Current

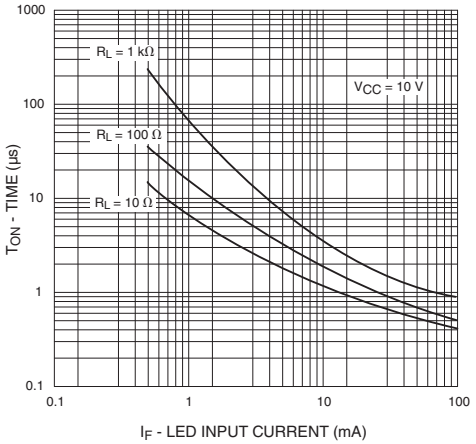
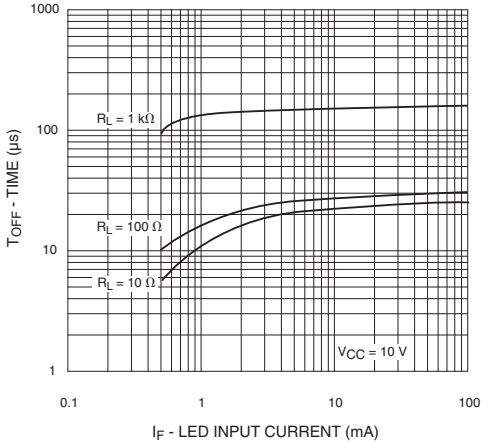
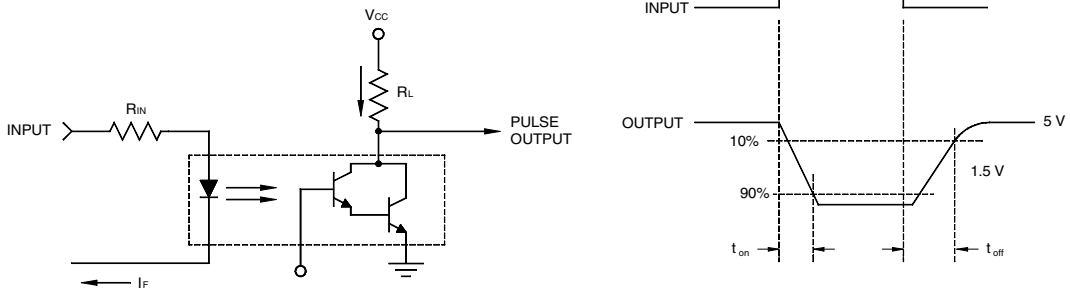


Fig. 6 Turn-Off Time vs. Input Current



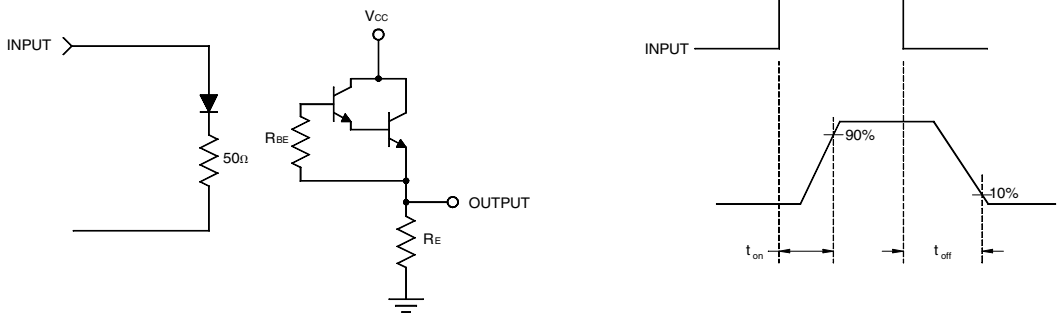
TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free air temperature unless otherwise specified) (Cont.)



Test Circuit (All devices except CNX48U) Switching Waveforms (All devices except CNX48U)

Fig. 7 Switching Time Test Circuit and Waveforms (All devices except CNX48U)



Test Circuit (CNX48U only) Switching Waveforms (CNX48U only)

Fig. 8 Switching Time Test Circuit and Waveforms (CNX48U only)

Notes

1. The current transfer ratio(I_C/I_F) is the ratio of the detector collector current to the LED input current with V_{CE} @ 10 V.
2. For this test, LED pins 1 and 2 are common and phototransistor pins 4,5 and 6 are common.

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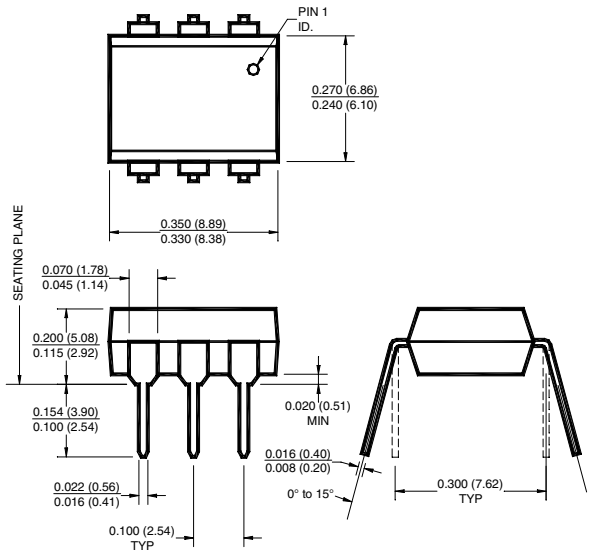
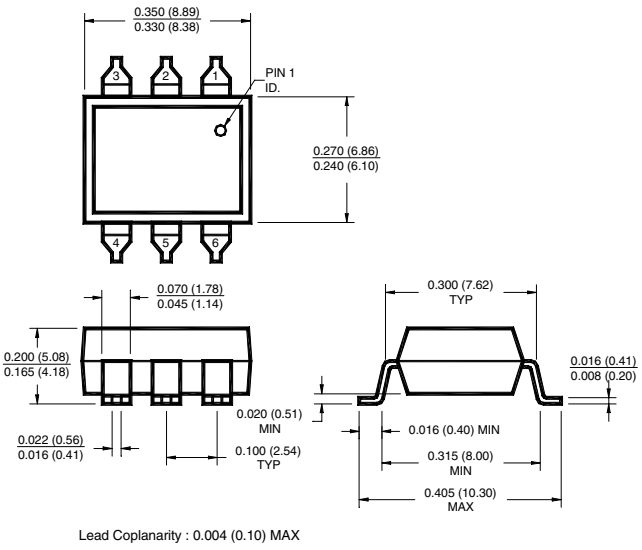
MOC8080 TIL113

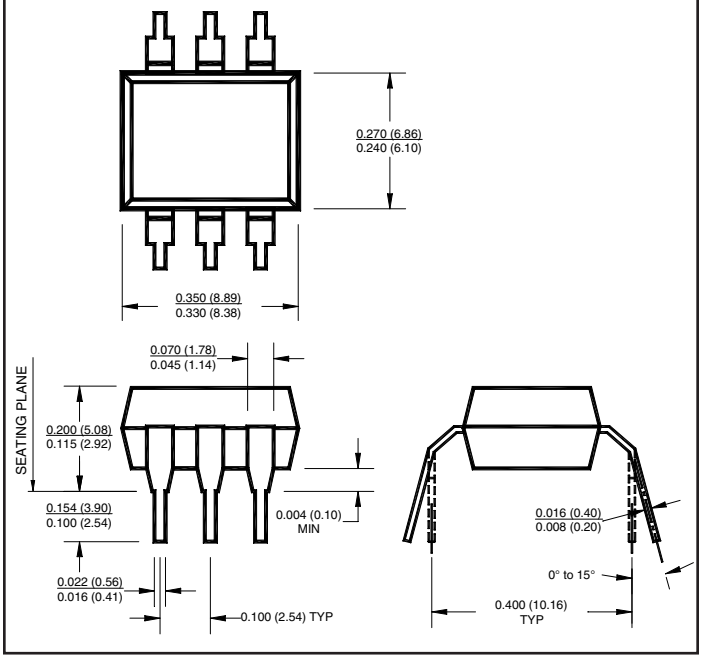
Package Dimensions (Through Hole)



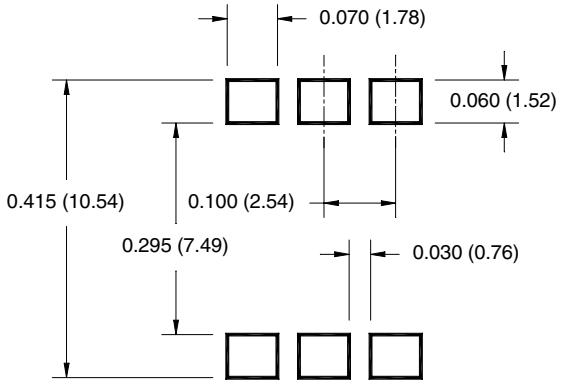
Package Dimensions (Surface Mount)



Package Dimensions (0.4”Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

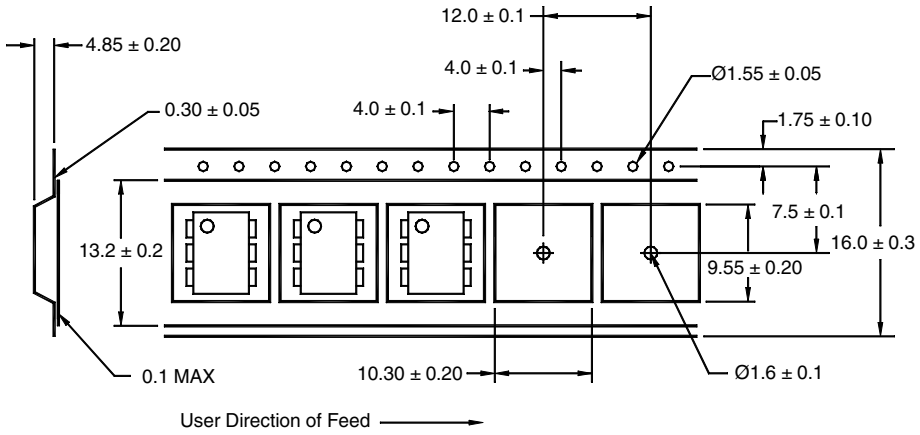
All dimensions are in inches (millimeters)

CNX48U H11B1 H11B2 H11B255 H11B3 MOC8080 TIL113

ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4” Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4” Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

QT Carrier Tape Specifications (“D” Taping Orientation)



NOTE

All dimensions are millimeters

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.